

Plankton Study/ Seine Study

Teacher's Guide

Subject: Integrated Science (Life; Earth-Space; Physical)

Topic: Record keeping and organism collection/sampling.

Summary:

Students will use seine and plankton nets to observe aquatic organisms at close range. Students will learn about the ecology of the estuary and try to determine how different organisms might interact in the food web. Students will record data on the various abiotic conditions of the sample area such as tidal stage, substrate type, etc.

After completing the field lab, students will be able to:

Objective(s):

1. Explain the flow of energy existing in an estuarine food web.
2. Identify a variety of fish adaptations
3. Relate adaptations to fish survival (mobility and feeding)
4. Observe, measure, record and compare selected structural features of the collected specimens

Ecosystem(s): Estuary, Bay

Equipment:

- | | | |
|--|---|------------------------------|
| • Seine net | • Fish/Invertebrate ID guide | • Plastic petri dishes |
| • Plankton ID guide | • Field microscopes/slides (examine plankton) | • Plankton sample containers |
| • Buckets or trays (examine specimens) | • Pipet (distribute plankton onto microscope) | |
| • Data sheets/clipboards | | |
| • Plankton net/sampler | | |

Background:

- Vocabulary: Plankton, Zooplankton, Benthic, Food Chain, producers, consumers, adaptations
- Reference Material: Fashion a Plankton Activity from NOAA, Marsh Munchers (Project Aquatic Wild) or Salt Marsh Players (Project WET), Seine Operation video, NOAA plankton activity
- Equipment Training: Microscopes/slides

Procedure (Engage; Explore; Explain)

1. Engage the students by asking a specific question that gets to the heart of the activity: **In what ways to plankton affect the estuarine food web? What reasons might juvenile organisms live in an estuarine environment? Why might fish have different fin or tail shapes?**
2. Use the students' answers to ascertain what they already know, clarify any misconceptions, and then ask them to formulate their own hypothesis relating to their own expectations of the outcome of the lab.
3. Students are reminded that during any study in which live specimens are collected-stress should be kept to a minimum and organisms should be released in a timely fashion.
4. Students will split into groups. One group will head to the plankton study area, and one group to the seine study area. Students should understand the roles of: data collector, seine operators, organism handlers, plankton samplers, etc. Students will have roughly 15 minutes at one study area and then switch.
5. Instructors will explain what procedure is at each area:
 - a. Plankton study: pull plankton net through water column and put sample into container, distribute plankton onto sample containers and then on microscope. Students should fill out data sheets.
 - b. Seine study: pull seine net and gather organisms, repeat a few times. Place a few organisms in different containers so students can study 3 organisms & fill out data sheets.
6. After completing the lab, allow the students to regroup to discover the diversity of organisms collected. Then answer the discussion questions as a group and explain their answers relating them to the concepts, processes and skills associated with the activity. Students should record their answers individually. At this time, facilitators can introduce/explain the specific concepts and explanations in a formal manner.

Sunshine State Standards:

Science: SC.G.1.3.5.7.3, SC.G.2.3.2.7.2, SC.H.1.3.1.7.1, SC.H.3.3.2.7.1

Math: MA.A.3.3.3, MA.A.4.3.1, MA.B.3.3.1, MA.B.4.3.1, MA.B.4.3.2, MA.C.1.3.1, MA.C.3.3.1, MA.D.1.3.1, MA.D.1.3.2, MA.E.1.3.1, MA.E.3.3.1

Geography/Social Studies: NATIONAL GEOGRAPHY STANDARDS #4, #8

Language Arts: LA.C.1.3.1.7.1, LA.C.1.3.4.7.1, LA.C.1.3.4.7.2, LA.C.1.3.4.7.3, LA.C.1.3.4.7.4

Plankton Study/ Seine Study

Student Data Sheet

General Information

Full Name:		Date:	
School (teacher):		Time:	
Latitude:		Longitude:	

Student Hypothesis and Rationale

If a snake or eel-like body shape is adapted to rocks and crevices, then we will find (more/less) _____ fish with this body type in a area with a sandy bottom with few rocks an crevices because . . . _____

Seine Study

Field Observations/Measurements

Structure	Organism 1	Organism 2	Organism 3
Body shape			
Tail shape			
Mouth (location and size)			
Teeth (location and size)			
Location of eyes			
Coloration/Pattern			
Organism identification (crab,shrimp,fish, etc.)			

Sketch an organism you collected: (label as organism 1,2, or 3)

Plankton Study/ Seine Study

Student Data Sheet

Name: _____ Date: _____ School: _____

Plankton Study

Field Observations/Measurements

	Estuary
Salinity (ppt):	
Diversity: <u>List the different kinds of plankton seen.</u> (Use Plankton Key)	In your drop:
	At your table:
Calculate Species Richness <u>(Count the # of different species of plankton)</u>	In your drop:
	At your table:
Were all or most of your organisms moving? Yes or No	
Target Organism: Type of zooplankton that is <u>most abundant</u> at your table	
Population Density: Count the <u>number of target organisms present.</u>	# in your drop:
	# in your group:

Draw one or more of your organisms and label:

Plankton Study/ Seine Study

Assessment

1. What specialized adaptations do some of the organisms sampled have to cope with the environmental conditions of an estuary? Give examples of specific organisms & adaptations to their habitat.

2. Give examples of organisms that serve as consumers and producers in the estuary:

Producers:

Consumers:

3. What does it mean when it is said that plankton are the base of the food chain? How does this relate to their abundance?

4. If a lot of nutrients were suddenly added to the estuary, what might happen to the phytoplankton population?

5. If we totally removed plankton from the estuarine food web, what would happen?

6. If a fish had a mouth that pointed upward, what type of food might it eat? What about if its mouth pointed downward or was on the underside of its body?



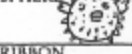

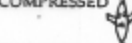
Plankton Study/ Seine Study

Reference Chart






TRAITS








Body Shape →

BODY SHAPE	DESCRIPTION	EXAMPLE
 FUSIFORM	streamlined and cylindrical; very fast and can swim continuously for long distances	bonito, mackerel, anchovy
 DEPRESSED	flattened from back to belly like a pancake; ambush prey with short bursts of speed; burrow into sand	skates, rays, goosefish
 SPHERICAL	rounded, globe-like; slow swimmers; may attract prey to them with light and lures	porcupine fish, puffer fish, anglerfish
 RIBBON	snake-like; slow swimmers but easily move through crevices; hide under rocks or in cracks and ambush prey which come too near their hideout	wolf eels, moray eel
 COMPRESSED	flattened side to side; sharp, quick turns and very maneuverable; viewed head-on they almost seem to disappear	surf perch, opaleye, flounder, angelfish

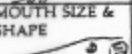
Tail Shape →

TAIL SHAPE	DESCRIPTION	EXAMPLE
 LUNATE (fastest)	fastest swimmers, maximum speed with minimum effort over long distances.	marlin, mackerel, dolphinfish
 FORKED	moderately fast, continuous swimmers	anchovy, herring
 SQUARED	very maneuverable, capable of bursts of speed for short distances	rockfish
 ROUNDED	very maneuverable, capable of bursts of speed for short distances	senorita, goby
 TAPERED (slowest)	slow swimmers, use body undulations to swim	moray eel

Color or Patterns →

COLOR PATTERNS	DESCRIPTION	EXAMPLE
 CAMOUFLAGE	match surroundings to blend in and hide	flounder, stonefish, cabezon
 DISRUPTIVE COLORATION	spots, stripes and patches of color breakup and diffuse the actual outline	keel fish, sergeant-major
 COUNTER-SHADING	dark back and lighter belly hides fish from predators as sunlight penetrates from above	anchovy
 ADVERTISING	1. warning to stay away from poisons or spines; 2. attract mates, defend territories 3. clean other fish	1. lionfish 2. California Sheephead 3. senorita
 DECEIVING	1. false eyespots confuse predators into attacking the wrong end or miscalculating size/shape of fish; 2. fish resembles objects of no interest to enemies; 3. fish mimics something: a. helpful like a cleaner or b. dangerous like a poisonous seasnake	1. Big Skate, butterfly fish 2. stonefish, sargassum fish 3. a. blenny, b. snake-eel

Mouth and Teeth →

MOUTH, TEETH, GILL RAKERS	DESCRIPTION	EXAMPLE
 MOUTH ORIENTATION	1. oriented upwards denotes surface feeder or feeds on prey above it; 2. downwards suggests bottom-grubber	1. stargazer, stonefish 2. goatfish
 MOUTH SIZE & SHAPE	1. large jaws engulf prey; 2. protrusible jaws suck in prey; 3. elongate jaws reach into crevices; 4. elongate lower jaw feeds on prey seen above	1. lingcod 2. trumpetfish 3. butterflyfish 4. halibut
 TEETH SIZE & SHAPE	1. fish eaters have pointed, knife-like teeth; 2. snails and clam eaters have plate-like grinders and crushers; 3. choppers on plants and corals have fused, beak-like	1. barracuda 2. bat ray 3. parrotfish

Some Examples of Fish Adaptations































Plankton Study/ Seine Study

Reference Chart

**SALTWATER FISH OF
FLORIDA**
Sauriwa - Apalachee Edition

+S+ = Seasons (For closed seasons, legal sizes, bag limits, and 10" ruler, see side 2.)
SV = Sport Value 1 to 5 FV = Food Value 1 to 5

James A. Harris, Jr., CFC
Franklin County Tax Collector
P.O. Drawer 188 Apalachicola FL 32329
Tel. (850) 653-9323 or 653-8384

 Greater AMBERJACK AVG 5-25 lbs SV 5 FV 4,5	 Crevalle JACK AVG 2-10 lbs SV 4 FV 1	 SAIL CAT AVG 2-6 lbs SV 3,5 FV 3,8	 COBIA AVG 8-20 lbs SV 3,5 FV 4	 BLUEFISH AVG 1-6 lbs SV 4 FV 3,5	 KING (Mackerel) ("Kingfish") AVG 4-15 lbs SV 4 FV 3,5
 Spanish MACKEREL AVG 1-4 lbs SV 3,5 FV 3,7	 Black SEA BASS (Blackfish) AVG 1-3 lbs SV 3,5 FV 4,2	 Florida POMPANO AVG 1-4 lbs SV 4,5 FV 5	 TARPON AVG 10-50 lbs SV 4,5 FV 1	 BLUE MARLIN (Billfish) AVG 75-300 lbs SV 4,5 FV 3,5	 Blacktip SHARK AVG 5-40 lbs SV 4,5 FV 4
 DOLPHIN (Mahi Mahi) AVG 3-40 lbs SV 4 FV 4	 BLACK DRUM AVG 2-20 lbs SV 3,7 FV 3,5	 REDFISH (Red Drum) AVG 1-7 lbs SV 3,8 FV 3,8	 SPOTTED SEATROUT +S+ AVG 1-8 lbs SV 3,5 FV 4	 SAND SEATROUT (Sand Trout) AVG 1/2 - 1,5 lbs SV 3 FV 3,3	 RED GROUPEE AVG 1-12 lbs SV 3,5 FV 4
 SPADEFISH AVG 1-8 lbs SV 3,8 FV 3,8	 GRAY ("Kingrove") SNAPPER AVG 1-3 lbs SV 3,8 FV 4	 RED SNAPPER +S+ AVG 1-7 lbs SV 3,5 FV 4	 WHITING (Kingfish) (Several Species) AVG 1/2-2 lbs SV 3 FV 3,8	 SHEEPSHEAD AVG 1-5 lbs SV 3,8 FV 4	 GAG GROUPEE AVG 2-12 lbs SV 4 FV 4,5
 TRIGGERFISH AVG 1-5 lbs SV 3,5 FV 3,8	 TRIPLETAIL AVG 2-9 lbs SV 3,5 FV 4	 FLOUNDER (Small Species) AVG 1-5 lbs SV 3 FV 4,0	 HOGFISH AVG 1-5 lbs SV 2,5 FV 4	 STRIPED MULLET +S+ AVG 9 oz - 3 lbs SV 2,5 FV 3,5	 Banded RUDDERFISH AVG 10 oz - 3 lbs SV 3,5 FV 3,5

Fish shown here are commoner species in Florida's Gulf and Atlantic waters. There are many other, less common or popular species that you may encounter.

Illustrations by
Diane Poole

Source: Florida Fish and Wildlife Conservation Commission